Science News-Letter

A Weekly Summary of Current Science

EDITED BY WATSON DAVIS

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SATURDAY, OCTOBER 23, 1926

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ASTRONOMY

Naked Eye Sunspots

An unusual number of sun spot groups, four of which can be seen by the naked eye when properly protected, have just been observed by Dr. Frederick Slocum, director of the Van Vleck Observatory of Wesleyan University, and other observatories. In fact, Prof. Slocum said that it was the finest display in many months.

"Early in October a period of marked activity began on the sun," said Prof. Slocum in a statement to Science Service. "By October 13 there were eight distinct groups of sun spots, the finest display since last December. Four of the spots could be seen with the unaided eye, with the aid of a piece of smoked glass or a piece of exposed photographic film.

"The largest single spot was forty-five thousand miles in diameter, and the largest group of spots one hundred and fifty thousand miles long. Five of the groups were in the northern hemisphere of the sun, forming a chain which extended completely across the solar disc. Three of these groups were nearly the same distance from the sun's equator, or from sixteen to seventeen degrees north in solar latitude.

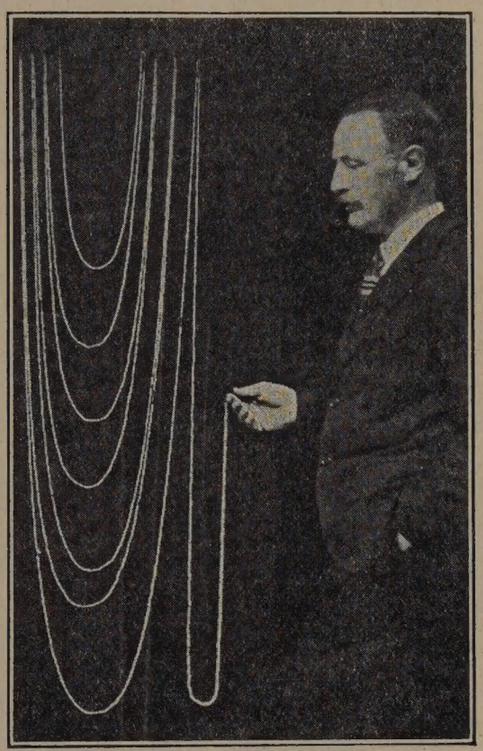
"Two other groups swung into view around the eastern edge of the sun, in latitude twenty-four and twenty-five degrees north. There were also two groups of spots in the sun's southern hemisphere, at latitude eight and nine degrees, but they were small and inconspicuous.

"A very marked feature of the sun was the contrast in number of spots between the northern and southern hemispheres, but this is not uncommon. According to early records, not a single spot was observed on the sun's northern hemisphere from the year 1672 until 1704.

"Since the sun rotates on its axis once in about twenty-seven days, most of the spots have now disap-

(*Just turn the page*)

ARCHÆOLOGY



DR. A. V. KIDDER WITH HIS 1000-YEAR-OLD BEADS

Bead Treasure

The rare find of a chain of hand-drilled beads 48 feet long, once the treasure of a prehistoric Indian medicine man, is reported by Dr. A. V. Kidder, anthropologist, who has just returned from a scientific expedition to New Mexico and has joined the staff of the National Research Council. The expedition, which was conducted by Phillipps Academy, of Andover, has been exploring the ruins of Pecos Pueblo for several years, but this year the accidental discovery of an older pueblo settlement was made. It was in this ruin, which dates back to about 1000 A. D., that the remarkable bead find was unearthed.

"The beads were discovered in the grave with the medicine man's skeleton," said Dr. Kidder. "The Indian's hair had been gathered into a mat at the back of his head, and the

(*Just turn the page*)

CHEMISTRY

The Catalysis of Coal

By Edwin E. Slosson

In the old days before the war men did not know anything better to do with coal than to burn it. Now they are beginning to find out that it may be put to better purposes as raw material for making more valuable commodities.

In those days too when men wanted to get more gasoline than petroleum contained they knew no other way to get it than to smash up the big molecules into little ones, to break down the heavy oils to make light oils. This "cracking" process was regarded as a great achievement in its day and brought fame and fortune to its inventor; quite rightly since we could be running few automobiles without it. But the world is passing into another era now, the age of synthesis, when the chemist will build up instead of breaking down. Starting with the commonest and cheapest materials, air, water and coal, the chemist can construct at will all sorts of valuable compounds for which we formerly had to rely upon nature.

The veteran French chemist, Prof. Paul Sabatier of Toulouse, recently on a visit to America, opened the door to this new era with the key called "catalysis." Shortly before the century closed he found that hydrogen gas could be made to unite with carbon monoxide gas in the presence of finely divided nickel and produce methane, well known as natural gas. Now these two constituents, hydrogen and carbon monoxide, are easily made by passing steam over redhot coal, the "water-gas" process. Many other metals and compounds have since been found to act like nickel as a catalyst, that is, they speed up a process by their presence without being used up or appearing among the products.

This principle has of late been applied with remarkable results by a countryman of Sabatier, General

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Bead Treasure

(Continued)

endless chain of beads was twined about this pigtail as an ornament.

"The beads represent a stupendous amount of labor on the part of patient craftsmen. The shells were brought to New Mexico by traders from the California coast. Each bead was then drilled by hand with a hard wooden drill, and each one was polished.

"The grave of the medicine man also yielded an assortment of his possessions, including a beautiful stone ax, a pouch containing medicine stones, flutes, raw turquoises, a stone pipe, and the paints which he used in making up for ceremonials."

Archæologists working in the region have hitherto concentrated on the Pecos Pueblo ruins, which lie on a high mesa and which were occupied until comparatively recent times. The existence of an older settlement was unsuspected until this summer. The camp of the expedition was set in the nearby lowland, and a member of the party was digging a hole here, in which to bury tin cans, when he came upon a skeleton. Immediate investigation revealed that this was the edge of a much older pueblo, deserted in pre-Columbian times.

"All of the rooms in this ancient pueblo have not been excavated," Dr. Kidder said, "but there is evidence that the place was hastily abandoned. In addition to the finding of fifty buried skeletons, scattered in various places, we have found several skeletons which were left unburied in rooms. One of these has a badly battered skull, indicating an attack or massacre. There is also evidence that the pueblo was set afire."

Science News-Letter, October 23, 1926

An Ohio nutrition specialist says that each day's food should include milk, vegetables, potatoes, fruit, cereals, and eggs, meat, poultry, or fish.

Among Indian tribes north of Mexico there were about 50 languages and groups of languages so distinct that no relationship between them has been traced.

It is never possible to be sure that a volcano is extinct; before the eruption of Vesuvius in 79 A. D. the volcano had been quiet long enough for a forest to grow up inside its crater.

Science News-Letter, October 23, 1926

Naked Eye Sunspots

(Continued)

peared, while all the spots will have passed out of sight around the western edge of the sun by October 26, perhaps to reappear again at the eastern edge in November."

These spots were responsible for brilliant displays of the aurora borealis, or northern lights on the nights of October 14 and 15, in the opinion of Dr. Edwin B. Frost, director of the Yerkes Observatory of the University of Chicago. On the 14th, he says, there was a display of great variety, which reached its height between 1 and 2 a. m.

The northern lights occurred just after the spots had been directly in the center of the sun's disc as seen from the earth.

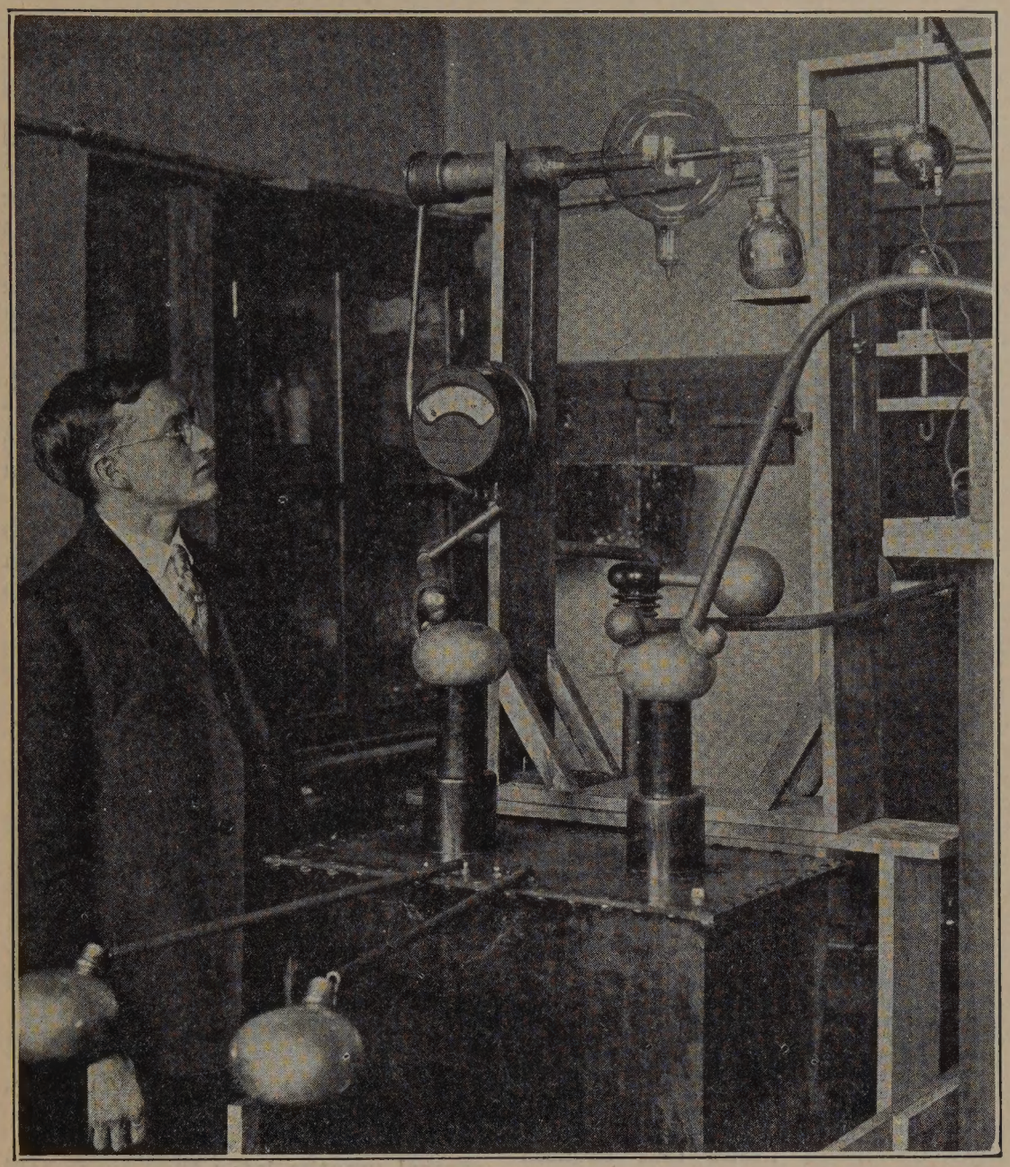
According to experiments conducted by Norwegian scientists, the aurora is caused by rapidly moving particles of electricity, or electrons, which are shot out from sun spots at speed almost as fast as light itself. As these come out straight from the spots, it is only when the spot is pointed towards the earth, or in the center of the solar disc as we see it, that the electrons come close enough to the earth to cause such phenomena.

These rays are attracted by a magnet, and the fact that the earth is a great magnet draws them when they get near the earth. In support of these ideas, experiments have been made by which the same sort of rapidly moving electrons have been obtained by high voltage electric currents and aimed at a small magnetized steel sphere, producing artificial auroras. The shapes of these man-made "northern lights" agree closely not only with the shapes computed mathematically in advance, but they are also very similar to the actual aurora borealis as revealed by photographs.

Though brilliant displays of the aurora are infrequent except in northern countries, the electrons are being given off from the sun to at least moderate extent continually. By analyzing the faint light from the northern night sky even on a dark night with a spectroscope, a green line is revealed due to the aurora. This can be observed when there is no trace to the eye of the northern lights. Though the origin of this green line has been a mystery, it has been shown recently that it can be duplicated by an electrical discharge through oxygen at the low temperatures that must prevail at the altitudes where the aurora occurs.

Science News-Letter, October 23, 1926

Crystals Glow with "Cold Light" under Cathode Rays



H. F. TAIRIS

Dr. Coolidge's assistant, with the new cathode ray tube and the apparatus for producing the current to run it.

By James Stokley

The days of "witchcraft" are over, and men are no longer imprisoned or executed for intercourse with the Devil—a fortunate fact for many modern scientists, for commonplace experiments in the chemical laboratory or the physics lecture room today would have cost their performers their heads not more than a few centuries ago. And some of the things now being performed in the modern research laboratory would have amazed even Roger Bacon and the pioneer scientists themselves.

The scene that has been enacted a number of times in a small room in the Laboratory of the General Electric Company at Schenectady, N. Y., in recent months is one of these. Last Wednesday evening it was repeated before a distinguished group of scientists at the Franklin Institute, in Philadelphia.

The room is darkened and the dim figure of the scientist is seen at a switchboard. Suddenly a light shines from a tube in the center of the room, but this is not the most conspicuous light, for in front of the tube is a crystal of calcite, a very pure form of marble, which shines with a red glow. Around the crystal is a solid ball of purple light, and the pungent odor of ozone permeates the room.

Again the scientist is seen to move a switch. The light in the tube ceases, as does the purple glow, but the crystal remains apparently red hot. Evidently the scientist does not mind being burned, however, for he calmly picks up the glowing crystal and passes it around. To the amazement of the spectators, it is cold, and looking at it closely, bluish white sparks are seen to come from spots on its surface, and then they cease, leaving a dark spot where the scintillations occurred. But the crystal continues to glow with this cold light for several hours.

The tube that does this is the latest invention of Dr. W. D. Coolidge, assistant director of the General Electric Company's Research Laboratory, but it is not his first great discovery. Mazda lamps, with their filaments of tungsten, have almost completely replaced the old carbon lamps that were used in the first days of electric lighting, and Dr. Coolidge is largely responsible for this. When tungsten was first used in electric lamps, the filaments were extremely brittle, and the slightest jar immediately put them out of commission, but Dr. Coolidge discovered a way to make strong, ductile filaments of tungsten. And so the tungsten lamp, which gives us many times as much light for our money as did the carbon lamps, came into its own.

Again, thousands of soldiers in the war who had their pain alleviated by the skilful use of X-rays, and thousands more in peace time who are indebted to the X-ray photograph for locating an abscessed tooth or a broken bone owe Dr. Coolidge a debt of gratitude. Roentgen discovered the X-rays in 1895, but for many years the best X-ray tubes were erratic in their behavior, until the invention of the Coolidge X-ray tube. This invention won for Dr. Coolidge the Howard N. Potts medal of the Franklin Institute, of Philadelphia, and it was upon the occasion of the award of this medal last Wednesday evening that he gave the first public demonstration of his new tube.

When a high voltage electrical discharge is passed through a glass tube into which a metallic terminal has been sealed at each end, and from which the air has been almost completely exhausted, a rapidly moving stream of minute electrical particles or electrons results. These streams of electrons are called cathode rays, and when they hit a piece of some dense metal, such as platinum, another kind of ray is given off. This secondary radiation forms the X-rays.

The electrons are parts of the atoms of which all matter is made, and in the ordinary cathode ray tube they are knocked out of the atoms comprising the aluminum cathode by

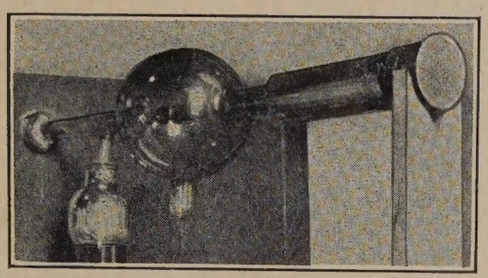
(*Just turn the page*)

Cathode Rays

(Continued)

positive ions coming from the small amount of air that remains within, for the vacuum, while high, is not perfect. But there is another way of getting electrons. The glowing filament in an electric lamp gives them off in abundance and Dr. Coolidge utilized this fact in his X-ray tube.

Instead of using an ordinary piece of metal for the cathode, one of the terminals inside the tube, the Coolidge X-ray tube makes use of a tiny electric light filament. So complete is the vacuum in the tube that with the highest voltages no current would pass through it when this little filament is cold. But when it is heated by a low voltage current, no more than that used in an automobile headlight, electrons are given off, and when a high voltage is applied, these electrons are driven against the heavy metal target, and



CATHODE RAY TUBE FROM THE FRONT

we have a steady and reliable source of X-rays.

This same hot cathode, the tiny electric light filament, is used in the new cathode ray tube. Many years ago the English scientist, Sir William Crookes, found that strange effects were observed when different substances were sealed within a cathode ray tube. Then a German physicist by the name of Lenard succeeded in getting the rays outside the tube by gluing a tiny piece of thin aluminum over a hole in one end. However, he used the old type cathode, and his aluminum window had to be small or else the pressure of the air would break it. If he made the aluminum thick enough to withstand the pressure over a larger window, it was too thick to let the rays through. The resulting radiation was very feeble.

Where Lenard was confined to a window an eighth of an inch in diameter, the new tube uses one three inches in diameter. It also uses more powerful electric discharges, for while Lenard put something like 30,000 volts into his tube, Dr. Coolidge puts 350,000. The tube of Lenard required for its operation that it should be connected to a high vacuum pump system, while the new tube can be sealed off from the pump and used in any position. Instead of aluminum, Dr. Coolidge makes use of a nickel window, five ten-thousandths of an inch thick and supported in back by a grid of molybdenum, to help it withstand the air pressure. Through this window come quantities of cathode rays far in excess of any that Crookes obtained inside his vacuum tube. Because the electrons are so much smaller than the atoms of which the window is made they can dodge between them and out into the open air, but the atoms of air are too large to squeeze through and into the tube.

It is these rays that produce such wonderful effects as that described in the first paragraphs. But the effect on calcite is not the only remarkable one. Curious chemical effects are produced. For example, when the gas acetylene is exposed to the rays, it turns into a yellowish brown powder, which is unique because no chemical has been found to dissolve it. Castor oil is no longer a liquid when the cathode rays are played upon it, but it too turns to a solid; water-clear crystals of cane sugar turn white, while white crystals of potassium chloride become purple.

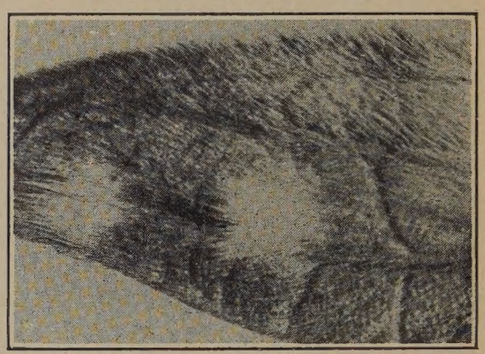
However, it is the effect of the rays on living tissue that arouses the most interest, and here may lie the future importance of the tube, for the cathode rays which it gives off are of precisely the nature, but of lower average velocity, than one of the most important rays of radium, the so-called beta rays, and Dr. Coolidge estimates that the new tube furnishes as many of these rays as a ton of radium. At the present price of radium, such an enormous amount would cost a hundred billion dollars ($100,000,000,000) but there is less than a pound of radium in existence in the world.

Small insects are killed with an exposure to the rays of a fraction of a second, while bacteria are killed almost instantly.

When the leaf of a rubber plant was exposed to the rays for a few seconds the rayed portion became covered with a white milky substance, as though the cell walls had been broken, but even more remarkable were the effects on the skin of a rabbit. First, his ear was rayed for a tenth of a second over an area about a half inch in diameter, and after a few days the skin became darker and the hair came out, and not until seven weeks later did the hair return.

Then a similar area was exposed to the rays for a second. This made a scab, and when it came off, the hair went with it, but two weeks later a profuse growth of snow white hair started and soon became much longer than the original gray hair.

But the cathode ray tube is hardly to be recommended as a cure for baldness for a third area of the rabbit's ear was rayed for nearly a minute. In this case a scab developed on both sides of the ear, which later fell out, leaving a hole, at first devoid of hair, but now fringed with the white hair. Apparently the rabbits used in these experiments were not seriously injured, however, for



WHITE HAIR ON A RABBIT'S EAR PRODUCED BY CATHODE RAYS

several months later they were still frisky, and there were more of them than when they had first arrived!

But though the rays from the new tube have such a powerful effect, with the highest voltage that has been used so far, the range of the rays is only two or three feet from the front of the tube, and with the highest possible voltages obtainable, this could probably not be increased to more than a few yards, a fortunate limitation, for it makes the apparatus unavailable as a weapon of offense in warfare.

But in the warfare of health against disease, and of scientific knowledge against ignorance, a powerful weapon has been provided, and one so new that even its inventor hesitates to predict its possibilities.

Science News-Letter, October 23, 1926

Temperatures 800 degrees higher than the heat of bubbling volcanoes are registered in cement kilns.

Science News-Letter, October 23, 1926

Latest Researches to Protect America's Public Health

Leaders in America's health work gathered at Buffalo, October 11 to 14, for the annual meeting of the American Public Health Association. On this page, Watson Davis reports the highlights of the meeting.

MEDICINE

Microbes Now On Run

No longer are the common contagious diseases common or the chief concern of those protecting the health of the nation. Today the microbe is on the run; man knows and foils his methods of warfare.

Heart diseases, acute respiratory diseases, cancer and the best methods of medical organization are the problems that public health workers are now wrestling with in their battle with premature death.

For civilization is now emerging from the A.P. (After Pasteur) era when mass attacks and civic sanitary measures based on the new science of bacteriology were the principal activity of medicine and health work; we are now entering a period in which health must be applied to the individual as an individual problem. This was the message contained in the presidential address of Prof. C. C.-E. A. Winslow of Yale University delivered before the American Public Health Association.

In the past half century the average length of life has increased seventeen years, Prof. Winslow pointed out. This means that in a mere two generations the average human being has been presented nearly 50 per cent more years of life, provided New York City statistics can be taken as representative. Diseases such as scarlet fever, diphtheria, diarrhea, and pulmonary tuberculosis are becoming less significant in mortality statistics. In fact, with the present effective campaign of organized immunization of preschool children with diphtheria toxin-antitoxin and the development of scarlet fever serum as an effective therapeutic agent, these two diseases should in a decade join smallpox in the potentially "dodo" disease class.

America's overheated houses were blamed by Prof. Winslow for a large part of the uncontrolled pneumonia, broncho-pneumonia, bronchitis and influenza that constitutes a major health problem. England with 60 degree houses suffers from broncho-pneumonia which flourishes where chill and dampness prevail; whereas America with houses heated to seventy degrees has excessive lobar-pneumonia rates. Both countries would be better off if they kept their houses at a temperature of 65 degrees.

A change in the fundamental system of payment for medical services may be necessary, Dr. Winslow suggested, if the individual is to have the benefit of the prevention of disease that so often obviates the necessity for cure. Perhaps the ideal of paying the doctor to keep one well rather than to cure one's ills may be approximated.

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MEDICINE

Average Life Now 58 Years

The present average duration of life in the United States is 58 years. Prof. Irving Fisher of Yale gave a schedule of how the duration of life should increase in the years to come assuming that a hundred-year average duration is the attainable limit.

In 1930, the average length of life will be 61; in 1940, 65; 1950, 69; 1960, 72; 1970, 75; 1980, 78; 1990, 80; 2000, 82. In the distant time of 2100 nearly everyone should live until 94 years of age.

Prof. Fisher pointed out that increases in length of life were being made at an amazing rate at the present time. The pace for the quarter century just past was 40 years increase per century, whereas it was only 4 years per century in the seventeenth and eighteenth centuries.

Prof. Fisher presented what he declared to be: "The most sensational conclusion which science has ever reached." It is that life cells and many tissues of man are potentially immortal in the purely physical sense. There will be a time, perhaps, when men will live, if not forever, at least much longer than the century mark which is now practically the limit of the human life span.

Prof. Woodruff of Yale, he recalled, found that no natural death occurred in 8,500 generations of a minute organism, paramecium, a period of time equal to 250,000 years of human life. Dr. Alexis Carrel of the Rockefeller Institute for Medical Research has kept a chicken heart growing and alive for over fifteen years, an age that no chicken can attain. Prof. Thomas H. Morgan of Columbia found that 1/250 part of a worm will regenerate and become younger than the original worm. The time will come perhaps, Dr. Fisher said, when the human being will have an indefinite life span, when his defective and worn-out parts can be replaced and renewed like those of a watch.

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MEDICINE

Value of Human Life

Fifteen hundred billion dollars. That is the estimated economic value of human lives of the men and women of this country as announced to the American Public Health Association by Dr. Louis I. Dublin, statistician of the Metropolitan Life Insurance Company. The vital capital measured in dollars and cents is about five times as great as the total national material wealth contained in money, stocks, bonds, merchandise, real estate, etc.

"One shudders a bit at the very thought of an economic evaluation of life," Dr. Dublin admitted, "for life in its full implication is not commensurable with money." Yet since money plays such an important part in life, it is important that the human being as an economic unit be evaluated.

The worth of a baby born to parents who have a family income of $2,500 a year is $9,333 at the time of birth. It will cost the parents some $10,000 to raise the child to the age of 18, provided the valuable but unpaid services of the mother are not included in the estimate. If the child is a boy, his net future earnings at this age is $29,000; at 25, he may be expected to make a net profit of $32,000 in future life. If he lives until he is 50, at that age he has the prospect of netting only $17,500 during the rest of his life.

With such a high economic value of human life, it is not amazing that Dr. Dublin finds that six billion dollars could be saved annually by applying what is known about modern preventive medicine and public health. The average American loses seven days a year through sickness and over a third of the deaths each year can be prevented.

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MEDICINE

More Poliomyelitis

An increase in the prevalence of poliomyelitis, infantile paralysis, may be expected next year on the grounds that it has been less prevalent this year than previously, according to Dr. M. J. Rosenau of Harvard. Poliomyelitis is still very much a mystery disease with a very high death rate, and much more research is necessary before the first step in its control can be taken.

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(By Science Service)

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Science News-Letter Is Already Indexed

In order to aid in catching the items that concern you and to facilitate clipping and filing, a key word in small capitals has been printed on the right of the line above each article. This follows the classification of the Library of Congress since this system has come into common use in the libraries of the country owing to the publication by the Government of the card index of all new books. We print below a list of the subject titles which will be most used in the SCIENCE NEWS-LETTER. "Outline Scheme of Classes," issued by the Library of Congress and purchasable from the Superintendent of Documents, Washington, for 10 cents, contains a more complete classification.

How To Clip and Classify

The SCIENCE NEWS-LETTER is a "cut-up" periodical. It aims to provide the information you want when and where you want it. It is a continuous loose-leaf supplement to any text-book or encyclopedia. But to make it most useful you must do your part. The best way to handle current news in science is to adopt the rule of the thrifty housewife in fruit season: "Eat what you can and what you can't eat you can."

Here is a good scheme if you haven't a better one. Get a dozen or twenty folders or envelopes which fit in a vertical filing case or drawer. Cut out the class titles of topics and paste on the upper edge of the envelopes. Or write on such titles as you prefer. If you use the Dewey Index or some other system put these numbers or letters in place of the Library of Congress marks.

As soon as you get a copy of SCIENCE NEWS-LETTER look it over, read through such articles as you have time to and cut out such as seem to you worth preserving for reference. Drop the clippings into their proper envelopes right away. Don't throw them into a desk drawer to accumulate until you have time to sort them over. You never will find time for that. At least we hope you will always have something more pleasant and profitable to do than filing a heap of old clippings. SCIENCE NEWS-LETTER is a new sort of magazine. Try a new way of using it.

Classification

B	Philosophy.
BF	Psychology.
G	Geography, voyages, travel.
GA	Mathematical and astronomical geography.
GB	Physical geography.
GC	Oceanology and oceanography.
GF	Anthropogeography.
GN	Anthropology. Somatology. Ethnology. Ethnography. Prehistoric archaeology.
GR	Folklore.
GT	Manners and customs.
GV	Sports and amusements. Games.
HC	Economic history and conditions. National production.
HE	Transportation and communication.
HF	Commerce.
HM	Sociology. General.
L	Education.
M	Music.
N	Fine Arts.
P	Philology and linguistics.
Q	Science. General.
QA	Mathematics.
QB	Astronomy.
QC	Physics.
QD	Chemistry.
QE	Geology.
QH	Natural history.
QK	Botany.
QL	Zoology.
QM	Human anatomy.
QP	Physiology.
QR	Bacteriology.
R	Medicine. General.
S	Agriculture. General.
SB	Field crops. Horticulture. Landscape gardening. Pests and plant diseases.
SD	Forestry.
SF	Animal culture. Veterinary medicine.
SH	Fish culture and fisheries.
SK	Hunting. Game protection.
T	Technology. General.
TA	Engineering — General.
TC	Hydraulic engineering.
TD	Sanitary and municipal engineering.
TE	Roads and pavements.
TF	Railroads.
TG	Bridges and roofs.
TH	Building construction.
TJ	Mechanical engineering.
TK	Electrical engineering and industries.
TL	Motor vehicles. Cycles. Aeronautics.
TN	Mineral industries. Mining and Metallurgy.
TP	Chemical technology.
TR	Photography.
TS	Manufactures.
TT	Trade.
TX	Domestic science.
U	Military science. General.
V	Naval science. General.

Most Powerful Naval Radio

A vacuum tube transmitter 80 times as powerful as the ordinary transmitter in a broadcasting station has just been installed in the Chollas Heights naval radio station, San Diego, Calif. This sending vacuum tube radiates 80,000 watts of electricity and is said by naval officials to be the most powerful tube transmitter in the world. It is four times as powerful as any other United States naval sending station.

This broadcasting device was not designed for telephone use, but will be employed for radio-telegraph communication, using dots, dashes and spaces, at a rate of 100 words a minute.

Chollas Heights is a remote control station, used by the navy for sending purposes only. The messages leave antenna strung on three masts which, 600 feet in height, form a triangle 1,100 feet on each side. The "cross arms," or platforms at the top of the masts, are 60 feet long and contain a bridge on which electricians may work. The actual sending is done from the Pt. Loma naval radio station, 11 miles distant across San Diego and the bay by air line. The Pt. Loma key works the Chollas Heights sender, while receiving is handled at Pt. Loma.

Six transmitters are employed in the station. The 80,000-watt tubes replace 200,000-watt arc transmitters. Under the new arrangement the station will be able to communicate with American ships in any part of the world during the night, when the station has a sending range of 12,500 miles; during the day it can span the continent to eastern points to a total of about 3,000 miles.

The set is operated from an alternating current commercial power supply, by means of six 50 kw. rectifier tubes which can deliver up to 150 kw. at 15,000 volts. Included is a 20,000-volt master oscillator which excites eight 20,000-volt amplifiers. The approximate antenna current is 300 amperes.

The significance of this station is found in the declaration of radio officials connected with its construction and operation that, if it proves completely successful as they predict it will, tube transmitters will replace all large arc transmitters such as are employed by the navy at Washington, D. C., Honolulu and Cavite.

The Chollas Heights set is one

(*Just turn the page*)

WILLIAM DAVID COOLIDGE

X- and Other- Ray Expert

To Dr. W. D. Coolidge, the distinguished assistant director of the General Electric Company's Research Laboratory at Schenectady, shown here in a characteristic mood, the SCIENCE NEWS-LETTER is glad to extend congratulations, not only upon the award of the Howard N. Potts Medal of the Franklin Institute, as described elsewhere in this issue, but also upon his birthday.

He was born upon the 23rd of October, 1873, in Hudson, Mass., and so far as he is aware is not related to the other prominent bearer of his name. But as they both came from the same part of the country, there may be some distant connection.

After graduating from the Massachusetts Institute of Technology in 1896, he studied at the University of Leipzig, taking his Ph.D there in 1899. Then he taught at his Boston alma mater until 1905, when he began physico-chemical research in the General Electric Company's laboratory, becoming assistant director in 1908. There his principal researches —on ductile tungsten, the Coolidge X-ray tube, and now, the new cathode ray tube—have been accomplished, while others which will doubtless prove equally important, are still in progress.

Science News-Letter, October 23, 1926

A star recently discovered appears so faint that it cannot be seen without a telescope, and yet is said to be 10 million times brighter than the sun.

Science News-Letter, October 23, 1926

Relics in Ancient Cave

Twenty baskets full of broken clay jars and bowls, found in a cave near the village of Heraklion, have been pronounced the most important discovery in recent years in the culture of the New Stone Age.

These valuable fragments of prehistoric pottery were unearthed by the University of Cincinnati's archæological expedition to Nemea, where excavations into old Greek ruins were being made. The unexpected find of the cave and the significance of the pottery, which has not yet been fully studied, is reported by the director of the excavations, Prof. Carl W. Blegen, in a recent issue of *Art and Archæology*.

A native farmer's excavations for a new threshing floor revealed bits of pottery which led the scientists to investigate the site, he explains. They were rewarded by finding a large natural cave, the roof of which had fallen in to fill the cave hole completely, and in this old home of prehistoric cave dwellers were bones of sheep and other animals and a great quantity of primitive dishes.

Pottery from this period of man's early development has never been plentiful, and the value of the cave's contents is increased by the fact that the clay fragments have been stored away in boxes according to the depth of earth in which they were found. When the soft, fragile bits have dried out and hardened they can be better studied, and Prof. Blegen believes that they will provide important stratigraphic evidence in tracing the development of pottery in the Neolithic Age.

The bulk of the sherds belong to perfectly plain vessels without decoration, Prof. Blegen states. Many of these are almost coal black in color; others are buff, and some appear to be red. Another kind of ware is described as being decorated in red paint, mostly with simple geometric figures, often filled with parallel lines or cross-hatching.

"The small area uncovered by our pit seems to be merely a sort of antechamber to the real cave itself," he concludes. "The complete exploration of this latter, which will be a large undertaking, will have to be resumed in the next campaign at Nemea, and may be expected to yield results of very great archæological and historical value."

Science News-Letter, October 23, 1926

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SCIENCE SERVICE
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Wrens feed entirely upon insects.

Eskimos dislike salt, explorers say.

The Japanese use cormorants to catch fish.

The first X-ray pictures were made 30 years ago.

Many insects that cannot fly still possess wing scales.

Stone age sculptors often made Venuses without legs.

Ostrich feathers were worn in the hair by men in ancient Egypt.

Weather reports are being received from weather stations in Greenland.

A single dandelion blossom produces about 365,000 grains of pollen.

The mental age of an idiot is about equal to that of a child of two years.

A method of making artificial silk was patented in 1884 by a Frenchman.

Amber was a favorite ornament worn by prehistoric man of the Stone Age.

A fire extinguishing paste containing carbon dioxide is on sale in England.

The life of uranium, the parent element of radium, is about eight billion years.

Chinese soldiers stationed at Hsuchow planted 21,000 trees on Arbor Day this year.

The ocean contains enough salt to cover all the land on earth with a layer 1,000 feet deep.

Because of the radium in the earth, this planet may be really getting hotter instead of cooler.

Most Powerful Naval Radio

(*Continued*)

of three built recently by an American company. A second was constructed for the Japanese government, like this in essential details though differing in some minor points. It has been shipped to Japan but no information is had on it after it left the Pacific Coast. A third was built for use in South America, but it is reported lack of funds has caused it to be stored at New York, where it had been sent for shipment.

The 20,000-watt tube used at Chollas Heights is the largest vacuum tube yet constructed for commercial use. It is so large and becomes so hot under ordinary conditions that the copper plate used is water cooled. Twenty-two volts of electricity are required to light the filaments in these tubes. The plates take from 7,500 to 15,000 volts.

The new transmitter cost $80,000. Chollas Heights station was originally constructed in 1914 on contract at a cost of about $350,000. At that time there was considerable discussion concerning the location of the station, some maintaining that it should be located at Riverside, 75 miles further north from the Mexican border. It is now located on a hill ten miles from the center of San Diego, with a view of both mountains and Pacific Ocean. The heavy towers are capable of withstanding a horizontal safe pull of 20,000 pounds.

Amateur broadcasting fans suffer no interference from the station, according to navy officers, even when in the immediate vicinity of the station.

Among other interesting facts, 50 gallons of water are required every minute to keep the tubes cool. The plate transformer weighs four and one-half tons, and the total weight of the set when packed is 58,500 pounds.

STUDY HELPS FOR SCIENCE CLASSES

(These articles will be found to be especially useful in class work.)

GENERAL SCIENCE

Naked Eye Sunspots, p. 49. Bead Treasure, p. 49. Jupiter Changes Aspect, p. 57. Anniversaries of Science, p. 63. Articles marked with * in classification below.

HYGIENE

Latest Researches to Protect America's Public Health,* p. 53. Dishes and Germs,* p. 59. The Efficiency of Bones, p. 61. Goat Serum for Measles, p. 63.

CHEMISTRY

The Catalysis of Coal,* p. 49. Dishes and Germs,* p. 59. Sun Injures Silk, p. 63.

BIOLOGY

Views Rubber with X-Rays, p. 57. Animal Experiments Open, p. 59. Nature Ramblings, p. 59.

PHYSICS

Crystals Glow with "Cold Light" Under Cathode Rays,* p. 51. Most Powerful Naval Radio, p. 55. Views Rubber with X-Rays, p. 57.

(This will fit on a 3 x 5 card.)

PHYSICS—CHEMISTRY

Views Rubber With X-Rays

The question whether raw rubber, apparently the most formless of substances, really has a crystalline structure appears to have been recently settled by actually seeing the crystal pattern produced on a luminous screen, according to Prof. George L. Clark, of the Massachusetts Institute of Techonology. Dr. Clark, in a report to the American Chemical Society, gives the credit for this achievement to Dr. Ernst Hauser, of the Metallbank of Frankfurt, Germany.

"Dr. Hauser and an assistant imprisoned themselves in total darkness for five hours," said Dr. Clark, "in order to make their eyes sensitive enough to see the faint pattern of spots produced on a glowing screen of calcium tungstate by X-rays which had passed through a sample of the rubber."

The effect, which is not the same as the familiar use of X-rays to reveal the bones of the body, flaws in metal, etc., was described by Dr. Clark as follows: "When a beam of X-rays pass through any material composed of crystals, such as salt or ice, a definite pattern is produced, and the design of the pattern depends on the arrangement of the atoms in the crystal. Noncrystalline substances, like glass, give no such patterns. Many materials and even rubber, have been studied in this way, and their patterns are more or less well known, but practically only from photographs. In the case of rubber it was especially important to see the pattern directly with the eye, in order to be sure that the crystal structure was not changed, or even, possibly, produced in the rubber by the action of the X-rays.

"Dr. Hauser and his helper not only subjected their own eyes to a long and tedious sensitizing process, but they used an X-ray tube of extraordinary power, which consumed 130 milliamperes of current at a potential of seventy thousand volts."

"When they turned on the X-rays after their long imprisonment," said Dr. Clark, "the hitherto unseen pattern flashed out instantly, faint but clear, against the pale greenish glow of the screen."

Dr. Hauser, beside being a noted scientist, is a great amateur automobile race-driver, and has won so many races in Germany that his rivals have tried to get him officially classified as a professional.

His work on rubber led Dr. Hauser into the wilds of the African jungle, where in a rudely built hut he set up the delicate heliostat necessary in taking microscopic motion pictures of the dissection of rubber latex globules, another of his hobbies. The "micromanipulator" with which the dissecting is done consists of a delicate system of tiny needles, which are made by Dr. Hauser's wife according to a secret process in which she is the greatest living expert.

Science News-Letter, October 23, 1926

MEDICINE

Contortionist Cancer Cells

Some of the magic that seems to surround the cause of cancer may be dissipated by observations reported by Prof. Waro Nakahara of the Government Institute for Infectious Diseases at Tokyo.

In the case of a cancer-like chicken disease, called Rous chicken sarcoma, it is well-known that the liquid portion of a mixture of its cells will produce the disease even after it has been passed through a Berkefeld filter, a piece of porcelain so fine that even bacteria can not get through its pores. This has caused medical research men to conclude that the cause of Rous sarcoma is what they called a "filter-passer," some sort of organism that was much smaller than the sort of bacteria that are large enough to be seen in high-powered microscopes. This conclusion was based on the assumption that because the cells of the cancer-like chicken disease were larger than bacteria they also could not get through the porcelain filter.

But now Prof. Nakahara finds that the cells of chicken sarcoma are contortionists. Even though larger than bacteria they can pass through smaller spaces. Their soft, jelly-like cells "stream" through the pores of the filter. The cells capable of performing this feat were found to be about 2.5 micra or one ten-thousandth of an inch in their longest dimension.

With these Japanese experiments subtantiated, it will be no longer necessary to assume a race of submicrobes as the cause of this cancer-like disease. For the disease resulting from inoculation of the filtrate can be explained as an actual transplantation of sarcoma cells.

Science News-Letter, October 23, 1926

Ventilation in the soil has been found to affect the growth and quality of plants.

Science News-Letter, October 23, 1926

ASTRONOMY

Jupiter Changes Aspect

Remarkable changes on the surface of Jupiter, as seen through the telescope, have occurred since June 1, declares E. C. Slipher, of the Lowell Observatory, prominent planetary observer. These have taken place principally in the planet's southern hemisphere, almost all of which has been affected, chiefly the broad belts which normally surround the planet, parallel to the equator, something like the zones on a terrestrial globe.

"The south tropical belt, which was broad and prominent in 1925 and earlier, has almost disappeared during the last two months," says Mr. Slipher, "and now that part of the planet is covered by a broad bright belt which is slightly brighter than the equatorial bright belt."

Another change has affected the "Great Red Spot." This first appeared in 1878 when it was about 25,000 miles long and 8,700 miles wide. At first it had a distinct reddish color, but this later faded out. According to Mr. Slipher, it now appears to show considerable color again, being decidedly pink, instead of the neutral gray that it has been in recent years.

"It is of interest to note," he says, "that in 1919 a change swept over the same region of Jupiter producing sensibly the same changes that have occurred in the present disturbance, and later the dark belts reappeared in much the same form and position that they formerly possessed."

Jupiter can now be seen as a brilliant star in the southern evening sky.

Science News-Letter, October 23, 1926

PHYSICS

Closest To Nothing

A new approach to absolute nothing, a vacuum so nearly complete that only enough free gas is left in it to cause a pressure of one billionth of a millimeter of mercury, or approximately one fifty-billionth of a pound per square inch, was reported by a woman scientist of Vienna, Mme. Anna Schiermann. The usual procedure in obtaining high vacuums is to introduce specially prepared carbon, which absorbs the remnants of the gases not removed by the powerful air pumps. For this carbon Mme. Schiermann substituted tungsten filaments, which proved much more efficient.

Science News-Letter, October 23, 1926

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The Catalysis of Coal

(*Continued from page 49*)

Georges Patart, and still more extensively in Germany by Prof. Franz Fischer, director of the Institute of Coal Research at Muelheim-Ruhr, and Dr. Friedrich Bergius of Heidelberg. All these three European leaders in catalytic research are coming to Pittsburgh to attend the International Conference on Coal held at the Carnegie Institute of Technology, November 15-19, and what they will have to tell of the application of catalysis to industry will surprise many of our people, for in this field America is far behind Germany and France.

For instance, we have been making methanol by the old fashioned method of distilling wood, but now the Badische Chemical Company makes ten to twenty tons of it a day from water gas at a cost of only 20 cents a gallon. Methanol, formerly known as "wood alcohol," has long been employed in all countries as a denaturant for industrial alcohol, and has caused many cases of blindness in Germany and America by being used for whisky by those who were already so blind as not to tell one alcohol from another. Various other alcohols, such as butyl alcohol, made in America by fermenting corn and used for automobile lacquers, are made in Germany from water gas. The waste gases that in some sections of the United States are still allowed to escape from coke ovens unused are, at the mines of Bethune, France, cooled and condensed and utilized for making methane, benzene, ethyl alcohol and ammonia.

Owing to the catalytic process for synthetic ammonia invented by Fritz Haber, Germany is now exporting fertilizer instead of importing it as before the war. About 425,000 tons of free nitrogen from the air is now fixed for fertilizers by catalysis every year, and this takes the place of 2,700,000 tons of Chilean nitrate. But Muscle Shoals still stands idle.

Benzene, which can be made from coal in various ways, is the mother substance of the aromatic family of chemical compounds, a family of over a hundred thousand and rapidly growing. Among these are the aniline dyes and drugs that have made the world brighter and safer in our generation. One of these synthetic products, carbolic acid, is familiarly used as an antiseptic and is nearly as useful but much less familiar as one of the two components of bakelite. The other component, formaldehyde, is also an antiseptic and also made artificially.

The chief stimulus to such investigations in Europe is the search for home-made motor fuel. We Americans are not interested in this question now but some day we shall be, and meantime it is interesting to watch the chemists over the water trying to see how many different things they can make out of common coal, like children playing with the Chinese tangram.

Science News-Letter, October 23, 1926

MEDICINE

Animal Experiments Open

Experiments on animals necessary for the progress of medical knowledge do not take place behind barred doors, despite the claims of the antivivisectionists.

The animal rooms of medical laboratories are always open to responsible visitors according to a survey of the medical colleges and research institutes of the country, recently conducted by the American Association for Medical Progress.

Several directors extend special invitations to officers of humane societies so that they can see for themselves the exact conditions under which animals are kept for experimental purposes. Some laboratories will only receive visitors who have seen operations performed on human beings because it is argued that only in this way can a lay person appreciate the similarity between the two and the care taken against inflicting pain and avoiding infection.

Science News-Letter, October 23, 1926

MEDICINE

Dishes and Germs

Germ-carrying dishes in public restaurants provide another menace to which the public is exposed. W. A. Hadfield and J. W. Yates, chemist and sanitation expert of Madison, Wis., have found how dishes can be made bacteriologically clean as well as clean in appearance. Chlorine is now widely used in treating and purifying drinking water in many communities. The experts recommend a similar treatment of dish rinsing water to kill the germs of the wash water that otherwise becomes heavily contaminated in even the cleanest establishments. They found the most satisfactory method of hand washing dishes was to use two compartments, one for washing and one for final rinse. Twenty-five to a hundred parts of sodium hypochlorite, a chemical that liberates chlorine, should be added to the rinse water in which the dishes should be immersed for at least a minute.

Science News-Letter, October 23, 1926

BIOLOGY

NATURE RAMBLINGS

By Frank Thone

Survivors of Civilization

This has been a great year for the ancient art of swimming, as practised by the human race, a species rather ill-adapted for swimming, all things considered, but making up in determination what it lacks in fins or gills. But it is autumn now, and the hardiest of the channel-swimming nereids and tritons have come ashore until the word shall go forth, next summer, that "the water's fine."

But the water is fine all year round for that most skilled swimmer among all terrestrial mammals, the otter. Without the special adaptations of such more strictly water-dwelling animals as the seal and the walrus, the otter is almost as much at home in their element as they are, and he has the advantage over them that he is still perfectly competent for a land life with all four feet. The otter is a member of that group of slim-bodied, short-legged carnivores that includes weasels, skunks, martens and minks, but though these are all good swimmers none of them has become primarily aquatic and fish-hunting in habit, as he has.

The otter does show some adaptations to his water-loving life, especially in his somewhat thickened tail, which serves as a powerful rudder, enabling him to twist and turn and follow the swiftest trout. His ears are reduced in size, and his fur is very smooth and sleek, looking almost like a naked skin when it is wet. It is this close, thick, lustrous fur that has made the otter the victim of unremitting persecution by hunters and trappers, and that the genus has been able to survive centuries of this is a real tribute to the otter's intelligent care of its young and its sturdy ability to look out for itself in a rough world.

Science News-Letter, October 23, 1926

When our eyes are in motion we are stone blind.

Elk once roamed this country from coast to coast.

Science News-Letter, October 23, 1926

News-Letter Features

Born over four years ago, on March 13, 1922, of the demand and interest of those individuals who had caught a glimpse of *Science Service's* news reports to newspapers, the SCIENCE NEWS-LETTER has since proved interesting to laymen, scientists, students, teachers and children.

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Nine volumes of the SCIENCE NEWS-LETTER have been issued in mimeographed form. Volume I consisted of numbers 50 to 90, inclusive, including the period March 13 to December 30, 1922; thereafter volumes consisted of 26 numbers covering half-year periods, with the exception of Volume IX which consisted of numbers 273 to 285, inclusive, and included the three-month period of July, August and September of this year. Volume X began with No. 286, the first to be printed, and will cover only the three last months of this year. Thereafter volumes will cover half-year periods. The pages in each volume will be numbered consecutively.

Radium becomes lead when its radioactivity ceases.

There are about 310,000,000 cubic miles of water in the ocean.

In some parts of India leopards have destroyed all of the dogs.

Every ton of coal burned involves a large waste of valuable material.

Terpineol, a substance having the odor of lilac, is made from turpentine.

More deep sea creatures give off phosphorescent light than creatures of shallow water.

The lifetime of a sardine, if it escapes the canning factory, is believed to be about 14 years.

Two Swedish engineers have invented a process of crushing up brick waste and making new building stones out of it.

Apple growers in Washington state are attempting to kill off codling moths by running a powerful electric current through the trees daily.

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ANATOMY

The Efficiency of Bones

Quotation from chapter on Anatomy by E. Barclay-Smith, in PROBLEMS OF MODERN SCIENCE. New York: Henry Holt and Co., 1922.

About the middle of the last century the anatomist first recognized that the spongy bone or lattice-work arrangement of bony substance, as seen in the expanded extremities of the thigh-bone, was not an unintelligible or haphazard arrangement. By careful study of the disposition of the minute bars of bony substance constituting the lattice-work, and estimating the chief stresses to which these parts of the bone are subject during life, it was discovered that the arrangement was such as to render the bone wonderfully efficient in resisting the forces to which it is subject, with the most economical use of the bony material imaginable.

The chief stresses to which the expanded ends of a bone such as the thigh-bones are subject are compressing or pushing forces and tension or pulling forces. If the lattice-work at the lower end of the thigh-bone be examined, the mechanical value of the arrangement of the bars of the lattice-work can be readily appreciated. In the standing position the weight of the body presses vertically in the length of the thigh-bone and will tend to compress the lower end. If the lattice work which goes to make up this end of the bone is sliced through, it presents the appearance of such delicate lacework as to suggest frailness. The minute slender bars which constitute the lattice-work have, however, a very definite arrangement. Most of the bars are vertically set—that is, exactly in the direction in which the pressure of the body-weight makes itself felt. Although any individual bar could not by itself bear any considerable pressure force, yet the total complement of the vertical bars endows this end of the bone with a resistance easily sufficient to withstand any compression to which it is subject during life. The vertically set, pressure-resisting bars are connected or tied together by shorter cross-bars. These cross-bars tying the vertical bars together prevent their spreading or buckling, as they are liable to do when being pressed upon from above, and are an essential and important part of the arrangement. In short, the lattice-work occupying the lower end of the thigh-bone is, in builder's parlance, a complicated system of struts and ties.

ANTHROPOLOGY

All Kinds of Men

THE RACES OF MAN. By A. C. Haddon. New York: Macmillan Co. $2.50.

In the flood of books on race which have appeared in recent years the general reader is apt to be swept away by recurrent waves of mere propaganda or speculation. He should welcome a good strong rock—even though a somewhat dry rock—on which to cling till he can face the sea with more confidence. A. C. Haddon's "The Races of Man" gives latest known conclusions of ethnology, clearly, sanely and as definitely as is possible in the present state of research. The author, an eminent anthropologist of Cambridge University, has no ax to grind and no hobby to exploit, though the compactness of his text makes it rather a manual for reference than a narrative for leisure hours.

BIOLOGY

Inferior Races?

Quotation from MODERN SCIENCE AND PEOPLE'S HEALTH. Edited by Benjamin C. Gruenberg. New York: W. W. Norton & Co., $2.50.

Take for example the differences in race. Presumably differences of race are just like these individual differences that have been built up as side issues along these ever forward-going streams of germ plasm. We have questions raised from time to time, as to the supposed inferiority of certain races. We always like to think that whatever race we belong to is better than any other race, and so we like to think that the other fellow isn't as good as we are. Naturally, he is inferior. But when we say that, we do not quite bear all of these things in mind. Perhaps the so-called inferior races are closer to the fundamentals than the so-called superior races from this point of view. Perhaps they are in a better position to pick up the modifications of present-day life which are of value and significance.

GENERAL SCIENCE

Other Worlds Than Ours

You tell us that Democritus says that there are a countless number of worlds, and that there are some which are not only so like one another, but so completely and absolutely equal in every point, that there is no difference whatever between them, and that they are quite innumerable; and so also are men.—Cicero: *Academic Questions.*

First Glances at New Books

THE PRUNING OF TREES AND SHRUBS. By W. Dallimore. London. Dulau & Co., Ltd. 4s 6d.

Tells the average householder or amateur orchardist how it should be done, and gives photographs of right and wrong ways. An especially valuable feature is an alphabetical list of shrubs with notes on the special treatment required by each.

LABORATORY OUTLINES IN BACTERIOLOGY AND IMMUNOLOGY. By John F. Norton and I. S. Falk. Chicago. The University of Chicago Press. $2.00.

A compact students' manual, beginning with the simplest directions for handling apparatus and media and working through to relatively difficult exercises in the handling of toxins and sera.

ANIMAL CLASSIFICATION AND DISTRIBUTION. By D. M. Reid. Philadelphia. J. B. Lippincott Co.

Admirably summed up by its own sub-title. "A précis reference book." An analytical syllabus of the animal kingdom, carried as far as the orders, with citations of illustrative genera, and a brief summary of zoogeography. The lack of glossary is unfortunate; but even so, every student in Zoology 1 should be required to own such a book as this.

HOW INSECTS LIVE, by Walter Housley Wellhouse, New York. The Macmillan Company. $5.00.

An elementary entomology of unusual merit, with natural history enough to moisten up the dry biscuits of anatomy and taxonomy. But the best and most original thing about it is the series of "family portraits" that illustrates the synoptical key in the back of the book.

A LABORATORY MANUAL FOR ELEMENTARY ZOOLOGY, by Libbie Henrietta Hyman, Chicago. The University of Chicago Press. $3.00.

A revision and enlargement of Dr. Hyman's well-known manual.

THE HYDROSTATIC SYSTEM OF TREES, by D. T. MacDougal, Washington. The Carnegie Institution.

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ANNIVERSARIES OF SCIENCE

October 28, 1909.—John D. Rockefeller gave $1,000,000 to fight hookworm.

One of the most bizarre things in medicine is the way hookworm gets into the body. It is an intestinal parasite, yet it gets in *through the skin.* In Southern States, a considerable part of the population walk around barefooted, and get what they call "ground itch," a local irritation especially between the toes, due to the local action of the hookworm embryo on his way in. He gets in through the skin to the blood, and travels all the way across country to the intestine—a most improbable story, but well proved. When he reaches the intestine he stays there, and gradually poisons the body. A good many people get so used to it that they do not have any symptoms and do not become anemic. They develop protective substances —anti-toxins—within their own system. But not everybody is so fortunate.

—Cabot: *Layman's Handbook of Medicine.*

October 28, 1899.—Death of Mergenthaler, inventor of the linotype.

The linotype operator writes on a keyboard similar to a typewriter. At each stroke a brass matrix of a letter, figure or punctuation mark drops into a groove. When there are enough in place to fill a line, molten metal is pumped against the matrices and the line-o-type results. As the operator is writing the next line the matrices of the line before are being automatically redistributed.

—Chicago Tribune: *The W. G. N.*

But words are things, and a small drop of ink,
Falling, like dew, upon a thought, produces
That which makes thousands, perhaps millions, think.

—Byron: *Don Juan.*

October 29, 1669.—Isaac Newton was elected Lucasian Professor of mathematics at Cambridge. He had to give lectures upon some branch of mathematics, and chose optics.

I saw that the perfection of telescopes was hitherto limited, not so much for want of glasses truly figured according to the prescriptions of Optick Authors (which all men have hitherto imagined), as because that light itself is a *Heterogeneous mixture of differently refrangible rays. . . .* This made me take reflections into consideration, and finding them regular, so that the Angle of Reflection of all sorts of rays was equal to their Angle of Incidence; I understood, that by their mediation Optick instruments might be brought to any degree of perfection imaginable, provided a reflecting substance could be found, which would polish as finely as glass, and *reflect* as much light as glass *transmits,* and the art of communicating to it a *Parabolick* figure be also attained. But these seemed very great difficulties.

—Newton: Communication to the Royal Society printed in *Philosophical Transactions No.* 80.

November 2, 1920.—First broadcasting by radio. Election returns were sent out by KDKA.

In a sense, broadcasting has always been with us. Every radio station radiates its messages, whether they be telegraph signals or spoken words, into space. Any one who has the proper electromagnetic ear can hear them. But not until 1920 was broadcasting placed upon a permanent commercial basis. It occurred to a few imaginative engineers of the Westinghouse Electric and Manufacturing Co., that interest in radio communication might become even greater than it was if songs and band music were broadcast. The experiment was timidly made. "'Did you hear us?" the announcer at the station asked. "Did you like it? Do you want more of it?" The response was overwhelming.

—Waldemar Kæmpffert in *A Popular History of American Invention.*

AGRICULTURE—CHEMISTRY

Need More Rubber Yield

Raising rubber trees so that they will give more of the milk that becomes the auto tire of commerce is more important than synthesizing man-made rubber in the laboratory, says Dr. L. E. Weber, rubber technologist of Boston.

"Under present practice the rubber tree yields about four pounds of rubber a year," Dr. Weber explained. "In the early days of the beet sugar industry the beet could only be made to yield two per cent of sugar. But the plant biologist got busy and cultivated it until he got a type that yielded just nine times as much. It may be fantastic to imagine that rubber trees could be bred to yield 36 pounds of rubber a year, but even if the present amount were merely doubled it would be an accomplishment unparalleled in its effect on the rubber industry of the world."

While the making of synthetic rubber may be one of the most fascinating problems of the chemist today, it is overshadowed in technical importance by the possibility of breeding better rubber trees, Dr. Weber believes.

HYGIENE

Goat Serum for Measles

An immunizing serum made from goat's blood that medical authorities believe will be of great use in checking measles epidemics, has been developed at the John McCormick Institute for Infectious Diseases.

Thirty-four out of thirty-nine exposed cases treated at the Cook County Hospital failed to contract the disease, Drs. Archibald L. Hoyne and Benjamin M. Gasul have reported to the American Medical Association.

Working in collaboration with Dr. Ruth Tunnicliff, who originated the serum, Drs. Hoyne and Gasul have established that if the serum is administered not later than five days after a child is exposed, 90 per cent protection is assured. The immunity is not permanent but lasts from two to four weeks and occasionally longer. Since measles is one of the most contagious of known diseases an immunity that can be procured of even this duration is of great importance in schools and institutions where children live in groups.

The goat serum presents the great advantage of being comparatively easy to obtain. Serum of the blood of adult patients recovering from measles has been heretofore used successfully to check such outbreaks but doctors have found it difficult to get in the quantities demanded.

CHEMISTRY

Sun Injures Silk

The silk dress milady has just bought this fall will probably last longer than the one she wore during the sunny afternoons this summer.

The wearing qualities of silk are greatly lessened by exposure to sunlight, it has been learned from tests recently completed at the U. S. Bureau of Standards. The strength of unweighted dyed silk decreased 25 per cent., it was found, when exposed to sunlight for 100 hours. Silk of cheaper grade that had been weighted with metal to give it a rich shimmering appearance lost as much as from 50 to 75 per cent in general tensile strength.

The silk garment that hangs in the closet or reclines in a bureau drawer is safe, apparently, for the tests showed that silk kept in storage for two and a half months gave no signs of deterioration.

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